

WHAT IS CLAIMED IS:

1. A magnetic memory device comprising:
  - a first interconnection which runs in a first direction;
  - 5 a second interconnection which runs in a second direction different from the first direction;
  - a magnetoresistive element which is arranged at an intersection of and between the first and second interconnections; and
- 10 a metal layer which is connected to the magnetoresistive element and has a side surface that partially coincides with a side surface of the magnetoresistive element.
2. The device according to claim 1, wherein
  - 15 the device further comprises a contact layer which is connected to the metal layer and covered with the metal layer,
  - the magnetoresistive element has a first side surface that is located on a side of the contact layer and a second side surface that is located on an opposite side of the first side surface, and
  - 20 the second side surface coincides with the side surface of the metal layer.
3. The device according to claim 2, wherein
  - 25 the contact layer is arranged below the second interconnection.
4. The device according to claim 1, further

comprising a contact layer which is arranged between the magnetoresistive element and the second interconnection and connected to the magnetoresistive element and the second interconnection.

5 5. The device according to claim 4, wherein the contact layer has a step portion.

6. The device according to claim 4, wherein a planar shape of the contact layer is substantially the same as a planar shape of the magnetoresistive element.

10 7. The device according to claim 1, wherein the magnetoresistive element has an axis of easy magnetization and an axis of hard magnetization, the first interconnection is a word line, and the second interconnection is a bit line, and  
15 the magnetoresistive element is arranged that the axis of easy magnetization matches the second direction.

8. The device according to claim 1, wherein the magnetoresistive element has an axis of easy magnetization and an axis of hard magnetization, the first interconnection is a word line, and the second interconnection is a bit line, and  
20 the magnetoresistive element is arranged that the axis of hard magnetization matches the second direction.

25 9. The device according to claim 1, wherein the metal layer is formed across the first

interconnection, and

the side surface of the metal layer above the first interconnection coincides with the side surface of the magnetoresistive element.

5 10. The device according to claim 1, wherein

the magnetoresistive element has first to fourth side surfaces, and

the first and second side surfaces entirely coincide with the side surfaces of the metal layer, and  
10 the third and fourth side surfaces partially coincide with the side surfaces of the metal layer.

11. The device according to claim 1, further comprising a third interconnection which is connected to the metal layer, runs parallel to the first  
15 interconnection on the same plane as that of the first interconnection, and is used as a read line.

12. The device according to claim 1, wherein the metal layer runs parallel to the first interconnection and is used as a read line.

20 13. The device according to claim 1, wherein

the magnetoresistive element has an axis of easy magnetization and an axis of hard magnetization, and

the side surfaces of the magnetoresistive element  
25 at two end portions along the axis of easy magnetization coincide with the side surfaces of the metal layer.

14. A method of manufacturing a magnetic memory

device, comprising:

sequentially forming a metal layer, a magneto-resistive film, and first and second mask layers on a first insulating film;

5 patterning the second mask layer into an element shape of a magnetoresistive element;

patterning the first mask layer into the element shape by using the patterned second mask layer;

10 patterning the magnetoresistive film into the element shape by using the patterned first mask layer to form the magnetoresistive element; and

15 patterning the metal layer into a separation shape that separates cells and making a side surface of the metal layer partially coincide with a side surface of the magnetoresistive element.

15. The method according to claim 14, wherein the method further comprises, after formation of the magnetoresistive element,

20 forming a resist on the first mask layer and the metal layer, and

patterning the resist into the separation shape, and

the metal layer is patterned by using the patterned resist.

25 16. The method according to claim 14, wherein in patterning the metal layer, the first mask layer is partially removed to form a step portion in the first

mask layer.

17. The method according to claim 14, further comprising, after patterning of the metal layer,

5 forming a second insulating film on the first insulating film, the magnetoresistive element, and the metal layer, and

10 removing the second insulating film until a surface of the first mask layer is exposed to form a contact formed from the first mask layer in a self-aligned manner.

18. The method according to claim 17, wherein the second insulating film is removed by CMP.

19. The method according to claim 14, wherein the first mask layer is formed from a conductive layer.

15 20. The method according to claim 14, wherein the second mask layer is formed from an insulating layer.

21. The method according to claim 14, wherein the method further comprising, after formation of the magnetoresistive element,

20 forming a third mask layer on the first mask layer and the metal layer,

forming a resist on the third mask layer,

25 patterning the resist into the separation shape, and

patterning the third mask layer into the separation shape by using the patterned resist, and the metal layer is patterned by using the

patterned third mask layer.

22. The method according to claim 21, wherein the third mask layer is formed from an insulating layer.

23. The method according to claim 14, further comprising, before patterning the metal layer into the separation shape, forming an insulating protective film on the side surfaces of the magnetoresistive element.